Supplementary Instructions for Installation of Draw Rod Bushings 115 kV and Above With Glass Bowl Sight Glass
Figure 1: Sectional View
These Instructions apply specifically to ABB O plus C Draw-Rod bushings 115 kV and above with a glass bowl sight glass Bushing Styles:

Refer to Instruction Leaflet 44-666 for installation and other general instructions.

The following tools/materials will be required for the assembly of this bushing.

1. Adjustable wrench
2. Adjustable face-pin type spanner wrench. (Pin Dia. 0.25 inch or less)
3. Curved jaw locking pliers
4. 2.5 inch open end wrench
5. Deep socket (15/16 inch across flats and 1.25 OD) with extension
6. Torque wrenches with 20 and 100 lb-ft range or one wrench with 10 to 100 lb-ft range.
7. 15 feet of 16 or 18 gage steel wire
8. Draw-Rod assembly tool: Part # 8534A30H01 (Supplied with the bushing.)
9. Petroleum jelly

A. For Installation of bushing when received direct from ABB Inc., Alamo, TN.

1. The bushing is supplied from the factory completely assembled with the draw rod assembly and upper and lower terminals and the lower shield. Refer to outline drawing for mounting and shield dimensions. See Figure 1 for other constructional features.

2. Refer to Instruction Leaflet 44-666 for installation and other general instructions.

B. Instructions for removal of bushing from the transformer after tests and prior to shipping to the site

If the complete bushing is to be removed for shipment then disconnect the transformer lead from the lower terminal and remove the bushing for shipment to the site.

If the transformer is shipped with the lower terminal/shield and draw rod in place, use the following procedure for preparing the bushing for shipment to the site.

1. Using an adjustable face-pin type spanner wrench, un-
WARNING

If the nut is not completely removed in step B3, the transformer lead will be damaged while removing the bushing from the transformer

4. Unbolt the bushing mounting flange and remove the bushing while holding the wire to support the draw rod assembly in place in the transformer. Make sure the belleville washers assembly is not disturbed during the above process.

Keep the bushing in the upright position so as not to disturb the belleville washers assembly inside the top terminal. Remove the wire and unscrew the draw rod assembly tool, while holding the draw rod assembly in place.

5. Using a curved jaw locking pliers, unscrew the upper draw rod from the connector nut, while holding the connector nut in place with an adjustable wrench.

6. Secure the lower draw rod to the main shipping cover plate as shown in Figure 3. Replace the small shipping cover plate. Refer to transformer instruction leaflet for more detailed information.

7. Replace/screw the draw rod nut on the top end of the upper draw rod enough to engage all the threads in the nut. Do not screw the nut too far down otherwise it will interfere with the assembly of the top terminal plug. Wrap cotton tape around the draw rod and the nut so that the nut does not come off during shipping.

8. Insert the other end of the draw rod into the conductor tube through the belleville washers assembly until the draw rod nut comes to rest on top of the belleville washers assembly.

9. Apply a light coat of petroleum jelly on the O ring gasket in the top terminal plug. Screw the plug in place and firmly tighten it with an adjustable face-pin type spanner wrench.

10. The bushing is now ready for shipment to the site. Refer to Instruction Leaflet 44-666 for handling and other instructions. Ship the draw rod assembly tool with the bushing.

C. Instructions for installation of bushing at the site when the bushing was shipped from the transformer factory after tests.

If the bushing was shipped complete with lower terminal/shield and the draw rod assembly, then install the bushing as per step A.

If the bushing was shipped without the lower terminal/draw rod assembly as per step B then use the following procedure to install the bushing. Refer to Instruction Leaflet 44-666 for handling and other instructions.

1. Using the appropriate procedure, remove the bushing from shipping crate and hang it upright from the crane.

2. Using an adjustable face-pin type spanner wrench, unscrew and remove the top terminal plug while holding the top terminal in place.

Figure 3: Shipping Cover Plates
3. Screw the draw rod assembly tool into the top end of upper draw rod. Pull the upper draw rod by holding on to the draw rod assembly tool. Remove the cotton tape and the draw rod nut from the upper draw rod. **Make sure the belleville washers assembly is not disturbed while removing the upper draw rod.**

4. Apply petroleum jelly on to the threads of upper draw rod and the draw rod nut.

5. Unbolt and remove the small shipping cover plate as shown in Figure 3. While holding the connector nut with an adjustable wrench, carefully unscrew and remove the draw rod shipping bolt from the main shipping cover plate. Unbolt and remove the main shipping cover plate. **Refer to transformer Instruction Book for more detailed information.**

6. **WARNING**
   
   Be careful not to drop the shipping bolt into the transformer tank. Care should be taken to support the lower draw rod during the above procedure otherwise it will fall into the transformer.

7. Install the bushing mounting flange gasket in place.

8. While hanging the bushing upright from the crane over the mounting area and above the draw rod, insert a steel wire into the tube through the belleville washers assembly until it comes out of the conductor tube at the bottom end.

9. Through the hole provided, tie this end of the wire to the top end of the draw rod assembly tool as shown in Figure 2.

10. While supporting the wire and the draw rod assembly, slowly lower the bushing over the draw rod until the top end of draw rod passes through all washers in the belleville washers assembly as shown in Figure 2.

11. While firmly supporting the wire and the draw rod assembly, slide the draw rod nut and the socket down over the wire and screw the nut on the draw rod as shown in Figure 2. **Do not tighten the nut at this point.** The purpose of screwing the nut is to prevent the draw rod from falling/sliding down. Remove the wire and the draw rod assembly tool from the upper end of the draw rod.

12. Using appropriate procedure, install the bushing in place.

13. Firmly tighten the top terminal into the clamping cap until it bottoms out, as shown in Figure 4.

14. Mark the position (Position 1) of the top terminal with respect to the clamping cap. Unscrew (counter clockwise) the top terminal by 1/4 turn and mark the new position (Position 2) of the top terminal with respect to the clamping cap.

15. While holding the top terminal in place in Position 2 as per step C14, tighten the draw rod nut with 10 lb-ft torque. Mark the position of the deep socket with respect to the top terminal. While holding the top terminal in position 2, tighten/turn the draw rod nut in the clockwise direction for 2.5 turns. This should take between 45 and 60 lb-ft torque. If the torque is more than 60 lb-ft then please contact ABB Alamo, TN for further information.

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*Figure 4: Belleville Washers Assembly*
WARNING

During the tightening procedure in step C15, the top terminal should be held in Position 2 with respect to clamping cap. Failure to follow the above procedure will result in overheating/failure of the bushing and the transformer. Do not turn the nut more than 2.5 turns as it will overtighten and may damage the draw rod assembly and may cause personal injury.

16. Apply a light coat of petroleum jelly on the O ring gasket in the top terminal plug. Screw the plug in place and firmly tighten it with an adjustable face-pin type spanner wrench.

17. The installation of the draw rod assembly is now complete.

D. Instructions for removal and replacement of bushing at site

The following instructions will apply when a draw rod bushing is to be removed at site and replaced with another bushing of the same style.

1. Using an adjustable face-pin type spanner wrench, unscrew and remove the top terminal plug from the old bushing.

2. Using a deep socket, loosen the draw rod nut to free up the lower terminal. Do not remove the draw rod nut completely.

3. Screw the draw rod assembly tool into the tapped hole at the top end of the upper draw rod until it bottoms as shown in Figure 2. Through the hole provided, tie a 15 ft. long 16 or 18 gage steel wire to the top end of the draw rod assembly tool as shown in figure 2. Fish the other end of the wire through the socket and slide the socket down to engage the nut.

While pulling the wire, unscrew the draw rod nut completely to free up the draw rod assembly. Hold the wire to support the draw rod assembly. Remove the deep socket, and the draw rod nut.

WARNING

If the nut is not completely removed in step D3, the transformer lead will be damaged while removing the bushing from the transformer.

4. Unbolt the old bushing mounting flange and remove the bushing while holding the wire to support the draw rod assembly in place in the transformer. Keep the bushing in the upright position so as not to disturb the belleville washers assembly inside the top terminal. Stand the bushing upright on a rack. Remove the wire from the draw rod and hold the draw rod in place.

5. Using a curved jaw locking pliers, firmly tighten the upper draw rod into the connector nut while holding the connector nut in place with an adjustable wrench. The upper draw rod must bottom into the connector nut.

If the old draw rod assembly parts are damaged then disconnect the whole assembly at the transformer lead and replace it with the new parts from the new bushing.

6. Hang the replacement bushing upright from the crane.

7. Using an adjustable face-pin type spanner wrench, unscrew and remove the top terminal plug.

8. Using a deep socket, unscrew and completely remove the draw rod nut while supporting the lower terminal firmly in place. If the upper draw rod unscrews at the connector nut then remove it by pulling it from the top.

WARNING

Unscrewing the draw rod nut will free up the whole draw rod assembly. This assembly weighs about 30 lbs. and care should be taken to support it firmly in place otherwise it will fall/slide down and may cause personal injury.

9. Raise the bushing and remove the draw rod lower terminal/assembly. Save this draw rod assembly along with the old bushing. Make sure the belleville washers assembly in the new bushing is not disturbed during the above process.

10. While hanging the new bushing upright from the crane over the mounting area and above the draw rod assembly, insert a 15 ft. long 16 or 18 gage steel wire into the tube through the belleville washers assembly until it comes out of the conductor tube at the bottom end. Through the hole provided, tie this end of the wire to the top end of draw rod assembly tool as shown in Figure 2.

11. While supporting the wire and the draw rod assembly, slowly lower the bushing over the draw rod until the top end of draw rod passes through all washers in the belleville washers assembly as shown in Figure 2.

12. Apply petroleum jelly on the threads of the draw rod nut and the upper draw rod.
13. While firmly supporting the wire and the draw rod assembly, slide the draw rod nut and the socket down over the wire and screw the nut on the draw rod as shown in Figure 2. Do not tighten the nut at this point.

14. Remove the wire and the draw rod assembly tool from the upper end of the draw rod.

15. Using the appropriate procedure mount the bushing on the transformer tank.

16. Firmly tighten the top terminal into the clamping cap until it bottoms out, as shown in Figure 4.

17. Mark the position (Position 1) of the top terminal with respect to the clamping cap. Unscrew (counter clockwise) the top terminal by 1/4 turn and mark the new position (Position 2) with respect to the clamping cap.

18. While holding the top terminal in place in Position 2 as per step D17, tighten the draw rod nut with 10 lb-ft torque. Mark the position of the deep socket with respect to the top terminal. While holding the top terminal in position 2, tighten/turn the draw rod nut in the clockwise direction for 2.5 turns. This should take between 45 and 60 lb-ft torque. If the torque is more than 60 lb-ft then please contact ABB Alamo, TN for further information.

WARNING

During the tightening procedure in step D18, the top terminal should be held in Position 2 with respect to clamping cap. Failure to follow the above procedure will result in overheating/failure of the bushing and the transformer. Do not turn the nut more than 2.5 turns as it will overtighten and may damage the draw rod assembly and may cause personal injury.

19. Apply a light coat of petroleum jelly on the O ring gasket in the top terminal plug. Screw the plug in place and firmly tighten it with an adjustable face-pin type spanner wrench.

20. The installation of the draw rod assembly is now complete.

E. Reassembly of belleville and flat washers

This procedure is to be used only if at any time the belleville washers orientation has been disturbed and they require rearranging.

1. Unscrew and remove the top terminal from the bushing.

2. Remove all the washers

3. Rearrange the belleville and flat washers as shown in Figure 4. The assembly of the washers can be simplified by inserting a rod through the top terminal and assembling the washers over the rod. After all the washers are in place, remove the rod.

WARNING

The orientation of the belleville and other washers is very critical for proper operation. Failure to follow the proper orientation will result in overheating/failure of the bushing and the transformer.

4. Apply a light coat of petroleum jelly on the top terminal gasket to avoid gasket damage during tightening.

5. Replace the gasket and screw the top terminal into the clamping cap. Follow the appropriate tightening procedure above.

Maintenance

For general maintenance, refer to Instruction Leaflet 44-666.

The top terminal in this bushing is tightened when draw rod nut is torqued and therefore does not need any subsequent tightening.

If top end overheating is detected during infrared thermal scanning, the top terminal should be removed and examined. If damage is observed in the top end parts, please call ABB Alamo, TN for further instructions.

If at any time the draw rod nut is unscrewed, proper tightening procedure given in Section C should be followed to insure the tightness of the draw rod and the top terminal assembly.

Replace the top terminal gaskets if any damage or hardening is observed.

Under normal circumstances there is no need to replace the belleville washers. If there is a need to replace these washers, they should be ordered from ABB. Do not use washers other than those supplied from ABB Alamo, TN.

WARNING

The tightness of the draw rod assembly and the top end parts is very critical for proper operation. Failure to follow the proper tightening procedure will result in overheating/failure of the bushing and the transformer.
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